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A Case of *Situs Inversus Visceram* in the Domestic Fowl

BY
J. G. CARR
B.E.C.C. Unit, Poultry Research Centre, Edinburgh

REVERSAL of the position of the viscera is a rare abnormality in vertebrates. It was first reported in animals by Aristotle. To date, about 500 cases have been reported in humans, most having been detected by X-ray or cardiograph examination. About a similar number are to be found in veterinary and biological literature. The condition is of considerable interest with regard to theories of the as yet unsolved problem of the cause of normal orientation of the viscera of vertebrates.

A striking feature is that this reversal seems never to have been reported in birds, though very many carcases are examined each year, and other abnormalities are reported. This was first pointed out by Mayer (1942), who, in addition to searching the literature also sited the experience of many American poultry pathologists. This absence of cases seems equally notable in this country, for no case has been seen in the many thousands of birds bred at this Centre. Dr. J. G. Campbell and Dr. W. G. Siller, both of the Centre, and Mr. J. E. Wilson, of Lasswade, also inform me they have never seen the condition.

The description of a case, apparently the first to be recorded in any living bird, seems therefore to be justified, especially as the specimen permits of a tentative suggestion as to the reason for the extreme rarity of the abnormality in birds.

The affected fowl, a brown Leghorn from the flock of the Poultry Research Centre, first attracted attention at the age of about two weeks because of a twisted neck. This condition, caused by misplacement and fusion of the cervical vertebrae, occurs with a frequency of about ½ per cent. in the flock. As usual, the neck condition began to cause difficulty to the bird as the bones grew, but nothing else abnormal was suspected. It was killed at the age of six weeks when, apart from the neck condition, it appeared to be a male of normal age development. However, when opened, the viscera were found to be almost entirely reversed.

Complete reversal down to the molecular level is, of course, impossible, as this would involve the stereo-configuration of the materials, and in practice the reversal is usually of varying degrees, as was found in this specimen. There seems little point in going into the minutiae of the findings, but in brief the outstanding features were as follows.

The gizzard lay on the right, with the duodenal loop and pancreas on the left, together with the two caeca. The transposition of the digestive tract appeared complete and perfect. The left testis and adrenal were higher than the right, which is the reverse of the normal. The liver looked most abnormal, and only on removal was it recognised to lie rotated 180° about a longitudinal axis, so that the ventral surfaces were the normal dorsal ones, and the normally left lobe lay on the right. The gall bladder was in the bird's left lobe, *i.e.* what would have been the correct position if the liver were replaced in the normal orientation. Compression by the sternum and other viscera had somewhat altered the general shape of the organ, but the main features were all readily recognisable. The oesophagus passed through a cavity between the two lobes. Because of the extremely irregular neck formation, nothing reliable could be deduced from the arrangement of the cervical viscera.

Without any further elaboration, this is clearly shown to be a typical example of *situs inversus visceram*, and this condition can, therefore, occur in the fowl. The neck abnormality requires some further consideration to decide whether it is related to the visceral malposition or not. Abnormalities of the axial skeleton seem relatively rare in cases of *situs inversus visceram* in other vertebrates.

A preparation of the bones of the neck showed fusion and displacement of the vertebrae which did not appear to differ in any way from that which occurs sporadically in the fowl. The problem is, therefore, to decide whether or not this merely represents the coincidence of two abnormalities. As the aetiology of each condition is obscure, a definite answer cannot be given, but one point deserves mention. In normal development, the embryo chick comes to lie with the head tucked under the right wing; other positions may occur, but usually lead to deformities due to pressure against the shell and greatly reduced hatchability. It may well be asked, "Under which wing is the normal position for the head of a *situs inversus visceram* bird?" It is not unlikely that the embryo failed to solve the problem—if indeed there is a correct solution—and the bone displacements are quite in accordance with a malposition effect. It might be normal position for the head of a *situs inversus vis*-human beings are not associated with a reversal of handedness (Cockayne, 1937).

Should this difficulty have arisen, then an explanation for the rarity of the condition in birds emerges. It may occur as frequently as in other vertebrates, but the affected embryo is less likely to hatch successfully as malposition is almost certain to result. Some slender evidence for this conception is supplied by the fact that *situs inversus visceram* has been described in a few embryos by Dareste (1891) and one by Gruenwald (1942), though very many less embryos are examined than hatched fowls. This case gives no evidence in favour of a genetic mechanism. From the mating which produced this bird, 71 eggs were set, of which 14 (20 per cent.) were infertile or died. This is about the normal figure, and it cannot be considered very likely that the dead-in-shell, which had not been examined, represented *situs inversus visceram* birds which had failed to hatch. Nothing abnormal had been noted for the hatched chicks.

Discussion

The cause of *situs inversus visceram* is unknown. It is rather frequent in human monsters (Foester, 1861) and has been ascribed to twinning, possibly with resorption of one partner. Cockayne (1937) gives good reasons for believing that many, if not all, human cases can be ascribed to a recessive gene, and finds no evidence that it is associated specifically with twins. He notes that there are cases in monozygotic twins with both partners affected, but not with one. Like others, he is inclined to refer the reversal in monsters to a different mechanism, as also the reversal of external features such as finger-prints which may be found in monozygotic twins without any indication of internal reversal. Tihen, Charles & Sippel (1948) describe a clear example of *situs inversus visceram* due to a recessive gene in the mouse. The condition can also be caused experimentally by a surgical interference with the amphibian embryo (Spemann, 1906; Pressler, 1911).

Erroneous statements to the effect that the condition may occur in the fowl due to abnormal rotation of the head are still to be found in the literature (*e.g.*, Lillie's *Development of the Chick*, 1952). This, as Mayer (1942) pointed out, is an error that has been transferred from text-book to text-book for over 100 years. It originated in a suggestion offered without any proof by von Baer in 1828, that abnormal rotation of the chick head may be the beginning of the derangement of the viscera. Dareste (1891) showed that this was not so, as did several later workers; yet the error continues to be reproduced, without even the excuse of a known example until this report.

The apparent absence of *situs inversus visceram* in birds was previously remarkable. The development of the embryo precluded dizygotic twins, and monozygotics would not hatch. There seemed nothing to preclude a genetic or other mechanism. It now appears that such arguments from a negative are no longer valid; and the present case, though offering no evidence for a genetic mechanism, is not conclusively against it. At the least, it removes one anomaly from consideration in this, so far, baffling problem.

Summary

The first case of *situs inversus visceram* in a bird is described. Deformation of the cervical vertebrae was also present. This is ascribed to malposition in the egg, and it is suggested that this is probably inevitable in this condition. Its rarity in birds is probably due, therefore, to reduced hatchability of affected embryos.

Acknowledgment.—All expenses in connection with this work were borne by the British Empire Cancer Campaign.

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THE QUEEN'S BIRTHDAY HONOURS LIST

The names of the following members of the profession appeared in the Queen's Birthday Honours List.

Mr. Grahame Williamson, Principal of the Veterinary School, Vom, Northern Nigeria, was awarded the C.B.E.

Mr. J. C. Davidson of the Animal Health Division, Ministry of Agriculture, and Mr. J. E. R. Roe, The Director of Veterinary Services, Bechuanaland Protectorate, were each awarded the O.B.E. Mr. G. F. Elliot, Deputy Director of the Veterinary Services, Northern Rhodesia, was awarded the M.B.E.

The award of the O.B.E. has also been conferred upon the following gentlemen:—Dr. J. F. Malcolm, M.F.C., Head of Department of Bacteriology, West of Scotland College of Agriculture, and Mr. E. V. Knight, B.SC., Farm Manager, Agricultural Research Council, Field Station, Compton, Berks.

An Outbreak of *Trombicula autumnalis* Infestation in Dogs

BY
GERALD W. DAKIN
Bromyard, Herefordshire

Introduction

Trombicula autumnalis is a member of the family *Trombidiidae* and is commonly known as the "harvest mite."

The mites of this family are scarlet, red, orange, or yellow in colour. The nymphs and adults are free-living, and feed either on invertebrates or plants, but the larvae are parasitic on various animals and man, causing marked irritation. The larval mites are found most frequently in autumn, and they attack grazing animals, and human beings working in low-lying fields. The natural hosts of the larvae are in most cases small rodents such as field mice, upon which the larvae attach and suck blood for a few days. They then drop off and moult to the nymphal stage.

T. autumnalis attacks man and practically all species of domestic animals.

Subject

A kennel of seven miniature poodles, all bitches, ages varying from eight months to two years. All animals were in the show clip, the hair being extremely long and dense in the appropriate areas. These animals had recently been moved into wooden kennels with grass runs attached. The runs were well drained and were rather dry and dusty owing to the hot August weather.

Symptoms

The owner complained that, during the weeks of hot weather in August, the dogs were scratching and biting themselves to such an extent that large pieces of hair were being torn out; in fact the kennels where the dogs slept contained masses of hair every morning. The owner also complained of a general loss of condition in the dogs.

When presented the dogs were showing an intense general pruritis and were intermittently scratching their ears, neck, thoracic and perineal regions, and biting the zones of long hair around hocks and knees.

Examination

On examination small (approximately $\frac{1}{2}$ mm. long) elongated orange-red larvae were seen in groups of approximately 6 to 20, closely adherent to the skin and attached by their heads. They were observed around the hocks, knees, elbows, perineum, vulva and the base of the tail. It was also noted that two animals had an acute wet eczema of the external meatus. These ear symptoms had developed some four or five days after the onset of general pruritis.

Diagnosis

Microscopical examination confirmed that the parasites were larvae of *T. autumnalis*.

Treatment

In view of the life cycle and habits of the mites, treatment was commenced as follows:—

1. All dogs were treated with a proprietary BHC shampoo containing 0.016 per cent. gamma-BHC in the wash. This treatment was repeated after a week.
2. The kennels and bedding of the dogs were washed down with a proprietary BHC wettable powder (50 per cent. BHC total isomers) diluting at 1 lb. to 20 gallons to give a wash containing 0.033 per cent. gamma-BHC.
3. The grass in the runs was cut down and kept short.
4. Kennel pens and bedding were dusted on alternate days with a derris dusting-powder.
5. Dogs were allowed to use the grass runs for restricted periods only, exercise being confined to a concrete yard.
6. Treatment of the otitis externa on the affected ears consisted of removal of excess hair from the external meatus and the application of an astringent lotion.

Results

The dogs were visited a week after treatment had commenced (*i.e.* the day after the second shampoo) when the owner reported a cessation of the scratching symptoms within two or three days after the commencement of treatment.

At this time no larval mites could be found on any of the dogs and the affected ears showed marked improvement. The dogs appeared to be free from irritation, there being no marked scratching and biting of the skin.

In order to prevent re-infestation it was suggested that the dogs should be shampooed in BHC-suspension at weekly intervals; this, together with careful attention to kennel management, to be carried out until weather changes inhibited mite activity.

Summary

An outbreak of *T. autumnalis* infestation in a kennel of miniature poodles is described. Treatment, involving the use of BHC washes together with attention to kennel management, was effective.

Acknowledgments.—I should like to thank Mr. J. C. Malone, B.SC., M.R.C.V.S., of the Cooper Technical Bureau for his kind help and assistance in identification of the mites and in providing suggestions regarding treatment.

Reference

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An Outbreak of Copper Poisoning in Sheep

BY

F. G. CLEGG

Veterinary Investigation Centre, Sutton Bonington

POISONING of sheep after the spraying of orchards with copper preparations has been described by Fincham (1945) and by Ogilvie (1954). A case of copper poisoning in sheep resulting from the use of a mineral mixture was investigated by Boughton & Hardy (1934). Naerland (1948) gives an account of deaths which occurred in a flock when 1 gramme of copper sulphate was added to the food for 100 days, and also when sheep had free access for several weeks to a salt lick containing 10 per cent. of copper sulphate. Eden (1940) describes the experimental production of copper poisoning in sheep.

Recently, investigations were carried out following losses in a flock of 16-month-old pedigree rams. Seven of the group of 15 rams died after a rapidly fatal febrile illness, the deaths occurring at the rate of about one per week.

Clinical Syndrome

The illness was rapid in onset, the animal usually being dead within 12 hours of the commencement of symptoms. In only one case was death delayed for up to 24 hours. The temperatures of the animals rose until the time of death to 106° F. or higher. Respiration was fast and shallow and there was marked jaundice of the sclera, together with haemoglobinuria, the colour of the urine being dark brown in all cases. One animal showed clonic spasms of the neck muscles, which caused the head to be drawn down between the fore limbs, and which suggested an involvement of the central nervous system.

Post-mortem Findings

The rams all died in excellent condition, each weighing nearly 3 cwt. *Post-mortem* examination showed a generalised icterus, the carcase fat being of an orange-yellow colour. The blood had a dark brown tinge and the serum was coffee-coloured. The heart showed many pinhead-sized sub-epicardial haemorrhages scattered thickly over both auricles, with no lesions of the endocardium. When the capsule was first stripped from the kidneys the cortex showed large dark areas which rapidly extended and deepened in colour, until the whole organ possessed a black metallic sheen. The spleen was soft in consistency, the pulp resembling blackberry jam. The urinary bladder was distended with dark coloured urine.

Microscopical examination of the urine by dark ground illumination failed to reveal the presence of leptospira. Biological examination of the urine by the intraperitoneal inoculation of guinea-pigs was negative. Extensive aerobic and anaerobic cultures of the viscera were also negative.

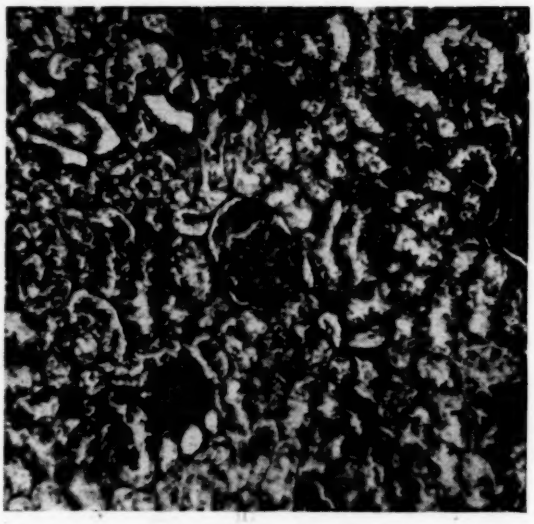

FIG. 1.
Renal cortex × 100 H & E showing necrosis of tubular epithelium.

Diagnosis

In view of the general *post-mortem* picture presented it was decided to investigate the possibility of copper poisoning, even though an extensive source of copper was not known. The Biochemistry Department at Weybridge reported copper values of 1,900 p.p.m. on a dry matter basis in the liver, and 0.21 mg. per 100 ml. in the blood of one animal. These figures, taken in conjunction with the *post-mortem* findings, confirmed the diagnosis of copper poisoning. Eden (1940) emphasises that a diagnosis of copper poisoning should not be based on chemical findings alone.

Histological examination of the tissues showed pronounced damage to the kidney and the liver. There was extensive tubular necrosis of the former with disintegration of the epithelial cells, and the smaller renal vessels were engorged with broken down erythrocytes (Fig. 1). The liver showed swelling of the hepatic cells, with fatty degeneration and vacuolation. Sections stained with potassium ferrocyanide showed copper to be present as red-brown copper-ferrocyanide. Sections were also stained with rubeanic acid, when the copper assumed a green shade.

Discussion

The rams were grazing a rye grass clover mixture, containing sainfoin. A meal consisting of oats maize, peas, locust bean and linseed cake was fed, each animal receiving 2 or 3 lb. a day, to which was

added a proprietary mineral supplement containing 1,300 p.p.m. of copper. This mineral supplement had been given for a year, and according to information given by the shepherd, the estimated quantity received by each ram per week was 5 grammes, although it is thought that considerably more may have been given. Ten days before the first death, the rams were drenched with a nicotine and copper sulphate worm medicine, made to the standards required by the British Veterinary Codex, and according to the dosage recommended.

After withdrawing the mineral supplement from the diet, no further illness was reported. It appears that the continuous administration of a copper-containing mineral mixture may be dangerous in some circumstances, especially if further medication with copper should occur.

Summary

A severe outbreak of copper poisoning in a group of rams is described. The long-standing administration of a copper-containing mineral mixture appears to have resulted in the storage of a dangerous amount of copper in the liver, and losses occurred after the administration of a copper-containing worm drench.

Acknowledgments.—I wish to thank Dr. H. Robertson of the School of Agriculture, University of Nottingham, for carrying out the copper estimation of the mineral supplement, the Biochemistry Department of the Veterinary Laboratory, Weybridge, for the copper estimation of tissues, and Dr. J. C. Buxton for advice and encouragement.

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THE EQUESTRIAN OLYMPIC GAMES

The selection committees of the British Horse Society and the British Show Jumping Association have nominated the following riders and horses to represent Great Britain in the Equestrian Olympic Games, 1956.

Three-Day Horse Trials

Riders: Lt.-Col. F. W. C. Weldon; Mr. A. E. Hill, and Major A. L. Rook. Reserve Rider, Lt.-Commander J. S. K. Oram.

Horses: H. M. The Queen's *Countryman*; Lt.-Col. F. W. C. Weldon's *Kilbarry*; Mr. E. E. Marsh's *Wild Venture*; Lt.-Commander J. Oram's *Copperplate*, and Mrs. K. S. Green's *Trident*.

Grand Prix Show Jumping

Riders: Mr. W. H. White; Miss Pat Smythe, and Mr. P. Robeson. Reserve Rider, Miss Dawn Palethorpe.

Horses: Mr. P. Robeson's *Craven A;* Capt. J. Palthorpe's *Earlsrath Rambler*, Mr. R. Hanson's *Flanagan;* Mr. W. H. White's *Nizefela;* Mrs. Bryan Marshall's *Nobbler*, and The Hon. Miss Dorothy Paget's *Scorchin*.

On Failing to Poison Chickens with *Senecio squalidus*, L.

BY

L. M. MARKSON

Ministry of Agriculture, Veterinary Laboratory, Weybridge, Surrey

A COLLEAGUE had sent for our opinion a fixed specimen of chicken liver with the following history. There was abundant ragwort on the farm, both in the fields and in the hay, and for some time cattle had been dying of a disease diagnosed as ragwort poisoning by the veterinary surgeon. Subsequently 60 chickens had died and the rest were ill with general debility and drowsiness. The common feature at autopsy was cirrhosis of the liver. The owner had reported that his chickens ate the growing ragwort; poisoning by this means was suspected.

The piece of liver submitted was firm rather than fibrous and covered with small, irregular, whitish spots. In the sections examined nothing was seen resembling the hepatic lesions of ragwort poisoning as found in, for example, cattle. There was instead a diffuse acute hepatitis with focal suppuration, suggestive of a bacterial cause. A factual report was sent and a mental note made to investigate at a future date the effect of feeding ragwort to chickens.

The following year, when *Senecio* species were in flower, a van load of *S. squalidus*, L. (Oxford Ragwort) was taken from a plot of waste ground near this laboratory. It is not known if this was the species implicated in the outbreak described in the first paragraph, as a specimen had not been made available to the author for specific identification. Nevertheless, according to Forsyth (1954): "Other British species of the genus *Senecio* are known to contain alkaloids which have a similar action on the body . . ." (similar, that is, to the alkaloids of *S. jacobaea*) and he quotes *S. squalidus* as an example. After the van load of plants had been dried and chaffed, 15 lb. were coarsely milled and thoroughly mixed with 135 lb. of breeder mash. Ten, apparently healthy, young, Rhode Island Red cockerels were housed in individual coops and fed solely on this contaminated mash, water being supplied *ad libitum*. No special steps were taken to determine the exact amount eaten by each cockerel; the food containers were all the same size and were filled twice a day. To minimise waste from spilling, the mash was fed liberally moistened with water, while the containers were fitted inside the coops so that any mash scattered on the floor by the cockerels could still be eaten. Despite the bitter taste of the weed, the contaminated mash was eaten readily. It lasted exactly one month, from which it can be deduced that, during that period, each cockerel consumed upwards of 1 lb. (allowing for wastage) of dried, ground *Senecio squalidus*. All appeared in the best of health. Two were killed immediately the special diet had been exhausted. The carcases in general, and the livers in particular, were completely healthy. The remaining eight cockerels were fed on normal breeder mash for another month and then

The Application of Aerosols to Atmospheric and Surface Disinfection in the Poultry Industry

II—Atmospheric Disinfection and its Value as a Means of Controlling Cross Infection

BY

E. G. HARRY

Houghton Poultry Research Station

DISINFECTION of the atmosphere is aimed at reducing the risk of transfer of airborne bacteria and viruses from infected to healthy stock. The disease agents principally transmitted in this way are those responsible for the respiratory diseases. Livestock which are infected with these diseases and are kept in confined spaces tend to contaminate the common air supply and thus transmit the infection to other susceptible animals enclosed with them.

The causative organisms of respiratory diseases may occur in the air in droplets, droplet nuclei, and in dust. Droplets are expelled from the infected animal by coughing or sneezing, and, dependent on their size, either rapidly settle out of the air and dry on nearby surfaces, or evaporate and produce droplet nuclei which float in the air and are circulated by air currents. Dust in the air on surfaces may thus be infected by contact with such droplets or droplet nuclei.

The transmission of infection by disease agents in aerial suspension has been reported by Rosebury (1947), Bourdillon & Glover (1948) and Henderson (1952) using experimental conditions, and by Sonkin (1951), Duguld & Wallace (1948) and Wallace and Duguid (1952) under natural conditions. In the case of poultry diseases, Grumbles *et al.* (1952) have reported on the spread of infectious sinusitis from turkeys to chickens kept in close proximity but not in direct contact.

The persistence of infectivity in airborne particles of the types described may be limited to a few seconds or may extend over a number of months. The deciding factor is principally the resistance of the organisms concerned to the lethal effects of desiccation. This, to some extent, is a characteristic of the organism; gram-positive cocci, for example, are more resistant to the effect of desiccation than gram-negative bacilli (Heller, 1941; Lowbury & Fox, 1953). Environmental factors are also involved, particularly the relative humidity of the atmosphere, as it has been shown (Dunklin & Puck, 1948) that the lethal effect of desiccation is increased when the period of dehydration is prolonged as occurs at relative humidities between 40 and 60 per cent. The infectivity of desiccated organisms such as those which occur in dust has been found to persist for long periods as detailed in the previous paper of this series (Harry, 1955).

The bacterial and virus content of air in enclosed space tends to build up as fresh infected particles are liberated from infected animals and infected dust is stirred up by the occupants. This build-up of potential disease agents in the air to levels conducive to cross infection can be avoided by either increasing the rate of ventilation or by instituting some method of air disinfection. Increase in ventilation often presents a number of practical and economic difficulties, particularly in poultry houses where it is often necessary to conserve heat and avoid draughts, so that the use of air disinfection suggests a more widely applicable control measure.

1.—The Mode of Action of Germicidal Aerosols on Airborne Bacteria

It was shown by Trillat (1938) that with certain chemicals the amount required to kill airborne bacteria is considerably less than that required to kill bacteria in aqueous suspension. A number of such chemicals which had a bactericidal titre of 1 in 200 in broth were found to be able to kill the same organisms in atmospheric suspension when present in the atmosphere in only 1 part in 5,000,000. The ability of these chemicals to disinfect atmospheres in dilutions of the order of parts per million, and less, makes it possible continuously to maintain germicidal concentrations of chemicals in the air without risk of toxic effects on persons or livestock

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killed. Once more the carcases gave no evidence of disease. Sample sections were made of the liver of each cockerel and all were perfectly normal. One of the first two cockerels killed and one of the remaining eight were cooked and consumed by the author and his wife who could detect no suspicion of taint.

It is concluded that, within the conditions of this experiment, *Senecio squalidus*, L. is harmless, when fed to chickens.

Summary

Over a period of one month, 10 cockerels were maintained on a diet containing 10 per cent. by weight of dried, ground *Senecio squalidus*, L. Each must have eaten upwards of 1 lb. of the dried weed. All survived the ordeal without the slightest evidence of disease.

Acknowledgments.—This work could not have been done without the co-operation of our Poultry Department which provided all the facilities for the experiment. My senior colleague, Mr. J. R. Hudson, guided me to the field of *Senecio squalidus* and identified the species.

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present. Not all chemicals used as disinfectants behave in this fashion, and the ability to disinfect airborne bacteria in extreme dilutions appears to depend on the disinfectants possessing certain physical characteristics of which their relative solubility in air, water and lipoids has been reported as being of particular importance (Twort *et al.*, 1946). Chemicals which have gained distinction as disinfectants for use in the liquid form are not invariably found to be outstanding when used for atmospheric disinfection. The converse is true also, as such effective atmospheric disinfectants as the glycols, for example, have little bactericidal action when used in the liquid form.

Types of chemicals which have been found particularly suitable for air disinfection by virtue of high bactericidal activity at non-toxic concentrations, are sodium hypochlorite and hypochlorous acid (Twort & Baker, 1942; Elford & van den Ende, 1945), lactic acid (Lovelock *et al.*, 1944), propylene and triethylene glycols (Puck *et al.*, 1945; Robertson, 1943), and phenols of low volatility such as hexylresorcinol, and resorcinol (Twort & Baker, 1942; MacKay, 1952; Pulvertaft, 1944).

When such chemicals are exposed to the air they evaporate at a rate which is dependent on their volatility and the surface area exposed. The vapour produced disperses in the air where it remains until it is removed either by physical or chemical reaction with the surfaces it contacts, by decomposition, or as the result of ventilation. The rate of loss of vapour from these causes in rooms is normally high enough to prevent bactericidal concentrations accumulating in the amosphere unless some means is adopted of accelerating the rate of evaporation. This is usually achieved by suspending the chemicals in the atmosphere in the form of microscopic sized particles known as aerosols, in order to expose as large a surface as possible for evaporation. One c.c. of a liquid, for example, when converted into aerosol particles of 5 microns diameter has its surface area increased to 12,000 sq. cm.

It was considered at one time that air disinfection with aerosols was brought about by the aerosol particles themselves coming into contact with the airborne bacteria (V. Smoluchowsky, 1916; Fuchs, 1934). This supposition, however, does not account for the rapidity with which aerosols act, and it is now generally considered that the lethal effect is due to the vapour derived from the aerosol particle (Baker, 1950; Lidwell & Lovelock, 1948; Puck, 1947), the latter acting merely as a mobile source of vapour, aiding its persistence and distribution.

2.—The Production of Bactericidal Concentrations of Vapour in the Atmosphere

Aerosols for atmospheric disinfection should be sufficiently small to remain airborne until completely evaporated. Their optimum size at the time of generation will therefore depend on the rate at which the compound used evaporates, but usually necessitates a size of less than 200 microns diameter. Such particles are usually generated either by heat volatilisation or by specially designed sprays. The use of the former method, however, is naturally restricted to heat-stable compounds.

Heat volatilisation, when applicable, is a convenient method of generating aerosols when a continuous output at a fixed rate is desired, as the apparatus required has no moving parts, consisting only of a heated container which is thermostatically controlled.

A number of different types of generator are available for producing aerosols mechanically. In the majority of these the chemical in liquid form is converted into an aerosol by being forced through a fine jet by means of air or " Freon " gas under compression. The liquid is thus broken up into small particles of sizes less than 200 microns diameter. The range of sizes liberated depends on the system of baffles used. Apart from large and bulky generators, however, the output of most machines of this type is low, being of the order of a few fl. oz. per hour which in some cases limits their use to relatively small rooms. An alternative method of generating aerosols by which a greater output is attained relative to the bulk of the generator is one in which the liquid is spun out of a rotating disc in the form of a thin film which is broken up into aerosol-sized particles by means of high velocity air currents. In this method of generation the size of the particles produced, and the output, can be controlled by adjusting the rate at which the liquid is spun out. A machine operating on this principle weighing 12 lb. is commercially available which is able to produce aerosol particles of a mean size of 120 microns diameter at an output rate of 10 fl. oz. per minute, and aerosols of less than 10 microns diameter at a rate of 0.3 fl. oz. per minute. Aerosols produced in this fashion have a higher velocity than those produced by vaporisation, or by baffled sprays, which results in rapid dispersal and more even distribution of vapour in the space being treated.

The effectiveness of air disinfection by chemicals depends on the concentration of vapour being maintained at a germicidal level for a sufficient period of time. It is, therefore, essential to ensure that the vapour is produced at an adequate rate and for it to be evenly distributed throughout the space being treated. The required output of vapour will depend on its bactericidal activity and persistence, and also on the relative humidity of the atmosphere. The minimal concentration at which a vapour has its maximal bactericidal activity can be determined by laboratory experiment such as by measuring its lethal effect on an airborne test organism under standardised conditions. (Report of Aerosols Panel of Brit. Disinfect. Manufac. Assn., 1949). This concentration, which constitutes the optimal level for air disinfection from the point of view of economy and avoidance of possible side effects, is usually lower than that required to saturate the air with vapour. For triethylene glycol, for example, maximum rates of bactericidal action are obtained at concentrations above 50 per cent. saturation (0.002 to 0.005 p.p.m.). Laboratory tests also demonstrate the influence of humidity on bactericidal activity. In the case of triethylene glycol vapour maximum bactericidal activity is obtained at humidities ranging from 20 to 50 per cent. (Lester *et al.*, 1950); above 50 per cent. humidity the bactericidal activity declines.

This effect of humidity on bactericidal activity

greatly influences the results obtained with air disinfection in practice. Baker & Twort (1951) found that aerosols of phenols and of many other types of germicide completely fail to act below 40 per cent. relative humidity. Maximum activity was found to occur at about 60 per cent. relative humidity which falls within the range of humidities at which the natural die-away rate of airborne bacteria is at its maximum (Dunklin & Puck, 1948). It is believed that the bacterial cell at these humidities is particularly susceptible to the toxic effect of chemical substances with which it comes into contact. The apparent exception in the case of triethylene glycol is considered due to the hydroscopic nature of this compound which results in progressive suppression of vaporisation, and consequent atmospheric concentration of the vapour, with increase of humidity.

It is found in practice that the amount of aerosol required to produce these bactericidal concentrations of vapour is much greater than the theoretical amount owing to losses of vapour resulting from absorption, chemical combination and the effect of ventilation. The stability of the vapour concentration is influenced considerably by the persistence of the aerosol form of the chemical in the atmosphere. This depends on the volatility of the chemical, the size of the particle, and the extent to which the air is saturated with the vapour. Particles of hexylresorcinol 1 micron in diameter, for example, persist in the atmosphere at normal room temperature for over one hour before they completely evaporate (MacKay, 1952). Vapour losses due to absorption and condensation effects are most marked in small spaces where the surface area of walls etc. is relatively large in proportion to the volume of the enclosed air. Losses due to the chemical reactivity of the vapour depend on the extent to which the vapour has access to material for which it has a chemical affinity. This factor is responsible for the difficulty in maintaining effective atmospheric concentrations of hypochlorous acid gas in the presence of organic matter. Losses due to the ventilation, except in rooms specially equipped with controlled ventilation, is apt to vary considerably as a result of haphazard opening and closing of doors and windows and varying external wind velocities. Of all the factors liable to influence vapour persistence uncontrolled ventilation is the one most difficult to compensate for, and is of particular importance when the method chosen for disinfecting the air involves the prolonged or continuous generation of low concentrations of vapour.

For the reasons given above, where no facilities are available for chemical analysis of the air, or direct measurement of bactericidal effect, it is advisable to generate the aerosol at a rate which will saturate the air with vapour. The attainment of saturation levels can readily be confirmed by the development of fog produced by condensation of excess vapour. This can be detected in slight amounts by means of an electric torch beam directed into a darkened corner of the space being treated. Saturating the atmosphere with vapour necessitates the use of an aerosol generator with a high output rate and is only practical with chemicals which are non-toxic at these higher concentrations. The most successful application of this method would be in sites where the reinfection rate of treated atmospheres is low, or when reinfection occurs at known times such as during operations which necessitate increased activity of the occupants of the treated space. In these cases the vapour need only be generated intermittently or during the periods of activity. This method has been successfully applied to air disinfection using triethylene glycol (Lester *et al.*, 1950) which has been found to be non-toxic when used at air saturation level (Robertson *et al.*, 1949).

3.—Methods of Estimating the Value of Air Disinfection

Standardised laboratory tests such as the one previously quoted can give valuable information on the relative activities of the vapours of various chemicals and thus indicate the approximate concentrations at which the vapours should be used at varying temperatures and humidities. Further information is often desirable in practice in order to determine the necessary frequency of air disinfection when this is used intermittently, and to confirm that the effect of air disinfection is not being offset by the presence of sources of infection resistant to the method of disinfection used. Such information can be obtained in two ways. Firstly, the air can be sampled by various methods so as to measure either the total bacterial population or the numbers of certain specific organisms remaining after disinfection. Secondly, the incidence of clinical or subclinical infections in the persons or animals living in premises in which air disinfection is carried out can be compared with that of a control group living in untreated premises.

In field studies in which the results of air disinfection are based on reduction of the total bacterial population of the atmosphere as by Lovelock & Raymond (1948), the assumption is made that the reduction in numbers of infective micro-organisms present will parallel that of the total population. In interpreting the results of such tests, attention must be paid to the relative proportions of bacteria, or bacteria-carrying particles of different degrees of susceptibility to chemical sterilisation present, and the relative infectivity of the resistant forms.

Desiccated bacteria and bacterial spores which are often found in dust are more resistant to the effect of chemical vapours than bacteria in an undesiccated form, so that the extent of reduction in total bacterial population produced by chemical vapours will depend on the proportion of such desiccated forms of bacteria present. Complete sterilisation of the air by means of germicidal aerosols is seldom achieved because of the presence of a certain number of these resistant forms of bacteria. Normally a reduction of 90 to 95 per cent. can be obtained with non-toxic concentrations of vapour, this being approximately equivalent to that produced by 20 air changes per hour. Where a high proportion of infected dust is present in the air, reduction by the levels of vapours non-toxic to persons present may be limited to less than 50 per cent. unless the dust content of the air is reduced by the use of separate measures (Harry, 1955). The value of dust control alone in limiting the spread of respiratory diseases in man has been reported by a number of workers (Wright *et al.*, 1944; Anderson *et al.*, 1944), and its value in con-

junction with air disinfection methods has been reported by Puck *et al.* (1945). Recent research by Markham *et al.* (1955) on the relative infectivity of various sized solid and liquid aerial dispersions of Newcastle disease virus and by Wells *et al.* (1948) in the case of particles contaminated with the tubercle bacillus, has shown that small particles such as those of 0.5 to 1 micron diameter are considerably more lethal than larger particles of over 100 microns diameter. It is believed that the larger particles are filtered out in the upper parts of the respiratory tract and are thus prevented from reaching the lower parts which are more susceptible to infection. Small particles are more readily destroyed by chemical vapours than large ones. It is probable, therefore, that in atmospheres where a high proportion of the infected particles present are in the form of coarse-sized dust particles and droplets, the effect of atmospheric disinfection in lowering the risk of transmission of infection may be greater than indicated by the reduction produced in the total bacterial population of the atmosphere.

The effectiveness of air disinfection can also be determined by measuring the reduction produced in the numbers of some specific organism which is indicative of respiratory pollution such as *Streptococcus salivarius* (Williams & Hirsch, 1950) or which is the potential disease agent such as beta haemolytic streptococci (Puck *et al.*, 1945).

Determination of the effectiveness of air disinfection by measuring the reduction produced in the incidence of specific clinical or subclinical infection is one which provides the most conclusive evidence of the value, or otherwise, of the disinfection process. It is, however, one which is exceedingly difficult to make in practice owing to the problem of standardising the conditions in both the treated and untreated groups of animals. It is necessary to use for these tests large numbers of animals in each group to overcome the effect of variations in individual susceptibility to the disease, and it is essential that these animals be housed in identical buildings subjected to the same conditions of ventilation, temperature and humidity, etc. A number of tests of this nature have been made on human beings (Dickson, 1953; Lidwell & Williams, 1954; Bigg *et al.*, 1947; Seal *et al.*, 1952). In all these tests, however, an uncontrolled factor existed in that colds or other respiratory infections may have been acquired outside the treated environment. This factor, which tends to limit the value of results obtained from tests on human beings, can be overcome in tests on animals, as animals can be confined to a fixed environment for the whole period of the test.

4.—The Value of Air Disinfection in the Control of Cross Infection as Shown by Recent Field Trials

Although the value of air disinfection as a means of reducing the numbers of airborne disease agents has been established by a number of tests under field conditions (MacKay, 1952; Puck *et al.*, 1945), its value as a means of restricting cross infection in practice has not yet been convincingly demonstrated. Favourable results obtained by some workers from the use of a particular germicidal vapour have been offset by the contradictory findings of other workers using the same method of disinfection in similarly planned trials.

Failure to obtain uniform results in these field trials may be due to a number of factors, probably the most important of which is the possibility that in the transmission of some diseases in the field, the transfer of infection by direct contact may be more important than transfer by the aerial route. Where infection is being spread principally by contact, air disinfection will be unlikely to have any observable effect. Contact infection may be either direct, as in mouth-to-mouth contact, which also includes the transfer of large droplets between respiratory tracts when animals are kept in close proximity, or indirect when some intermediate vehicle is involved, such as food or water. This factor was considered by Krugman (1951) to be the reason for certain inconsistencies observed in the trials he made on the use of triethylene glycol vapour in hospital wards. In one of these trials the cross infection rate, determined by the incidence of respiratory diseases in the treated ward, was lowered. In a subsequent test, however, where the use of glycol vapour was accompanied by dust suppressive measures, which were expected to enhance the effect of the air disinfection, the cross infection rate in the treated ward was higher than that in the control ward. Normally, however, in hospitals, where contact infection is limited to a certain extent by the use of aseptic measures, air disinfection has been found to be effective in preventing the spread of respiratory diseases (Hamburger *et al.*, 1945; Puck *et al.*, 1945) in contrast to the results obtained in trials carried out in places such as offices, barracks, etc., where the extent of contact infection is likely to be higher. This factor, in addition to the possibility of infection having occurred outside the treated environment, probably explains the discrepancies obtained in the results of recent trials on the use of hexylresorcinol and triethylene glycol vapours for the prevention or limitation of the spread of respiratory infections in man. Dickson (1953) found that the use of hexylresorcinol vapour resulted in a decrease in sick absence rate in office workers, but Lidwell & Williams (1954) in a trial made under similar circumstances failed to detect any beneficial effect from its use. In the case of triethylene glycol Biggs *et al.* (1947) in naval barracks found that the incidence of respiratory disease, as measured over a period of 10 weeks on groups of 500 men, was 46.2 per cent. less in the treated rooms compared with that in the untreated control rooms. Seal *et al.* (1952), however, in a similar trial, also in naval barracks, failed to find any difference in the incidence of respiratory infection as a result of using triethylene glycol.

In trials made by Ellis *et al.* (1952) on chickens, the birds in the treated and untreated groups were kept in the same environment for the duration of the tests. It was found that triethylene glycol vapour appeared to reduce the incidence of Newcastle disease as estimated by the development of H.I. titres in the blood of treated birds, but it failed to prevent the spread of a mild form of the disease. In this case failure to achieve a more striking result was attributed to the difficulty in practice of maintaining the hum-

idity at levels which assist the germicidal activity of the vapour and also to the inability of preventing the atmosphere becoming contaminated with dust as a result of the close proximity and activity of the birds. The influence of these two factors on the effectiveness of air disinfection measures has been commented on in the previous sections.

Apart from reports of specially designed trials, such as those described, a number of reports have been published where the incidence of infection in premises housing poultry and other animals has been compared before and after the introduction of air disinfection measures. Polderman (1947, 1949), for example, has reported a number of such observations in which the use of triethylene glycol vapour appeared of value. Similarly based claims of the value of air disinfection for eliminating cross infection have also been made by McGrath (1953) in the case of hexyl resorcinol vapour used in the Dublin Zoo monkey house. In this case morbidity from upper respiratory tract infections "almost disappeared and there has been no case of tuberculosis" following the introduction of resorcinol and subsequently hexylresorcinol aerosols. In considering evidence such as this, however, it must be borne in mind that in the absence of controls it is not possible to be certain that the improvements which have been recorded were not influenced by concurrent changes in the animals involved or in their environment.

The results obtained in the trials described indicate the difficulty with which the value of air disinfection in practice can be assessed. They also stress the importance of two factors which are particularly likely to determine the degree of protection to be gained by the use of air disinfection. The first of these is, that to obtain the maximum advantage from the use of air disinfection opportunities for acquiring infection through exposure to an untreated environment should be avoided. This limits the successful application of air disinfection in the case of man—where the environment is frequently and regularly changed—to cases where it is considered that the risk of infection occurs principally in the environment to be treated. In the case of livestock access to untrea ed environments can be prevented so that the application of air disinfection can be expected to produce an increased measure of success. The second point of importance is that air disinfection can only be of value in situations where the airborne route of infection is likely to be the important one. In sites where contact infection is prevented or limited, by asepsis or by strict attention to hygiene, the value of air disinfection in preventing cross infection can be confidently predicted. Until further information is available, however, on the epidemiology of acute infectious diseases in crowded populations, where asepsis is neither possible or practicable, the relative importance of the airborne route of infection in such environments cannot as yet be predicted and therefore no conclusions can be made on the potential value of air disinfection in them.

Justification for the use of air disinfection, therefore, depends on a consideration of the factors mentioned. Situations in which contact infection can be limited and where air disinfection will probably be of value, are hatcheries in the case of chicks from different incubators and from different hatches, poultry houses where the birds are housed under the battery system in solid wall cages of the non-cafeteria type, and other poultry houses when stock is moved around and surfaces in the empty buildings are simultaneously disinfected. Another possible use for air disinfection is the setting up of bactericidal barriers in spaces such as corridors, etc., which serve as a link between different animal houses. For this purpose a continuously running aerosol generator of the vaporiser type would be suitable. The value of air disinfection in buildings containing birds which are kept under intensive conditions, such as broiler and deep litter houses, is dubious and remains to be demonstrated. It is possible that in sites like these transmission of infection would be more effectively restricted by other methods of control such as the introduction of a strict policy of isolation of infected birds in the early stages of infection, immunisation against the infective agent where practicable, or by prophylaxis or therapy with one of the sulphonamides, furans or antibiotics to which the infective agent is susceptible.

Summary

(1) The significance of the contamination of the atmosphere with bacteria and viruses on the transmission of infectious diseases has been emphasised.

(2) The mode of action of chemical vapours on airborne micro-organisms has been outlined with particular reference to the value of aerosols for disseminating such vapours.

(3) Methods of producing aerosols have been detailed and suggestions have been made on the most suitable applications of the various types of generators described.

(4) The necessity of maintaining the concentration of vapour in the atmosphere at or above minimum germicidal levels for a sufficient time to reduce the microbial population to desirable levels is stressed. In this connection attention has been drawn to the effect of ventilation and chemical and physical absorption on the persistence of vapours in the atmosphere.

(5) A method of generating supraminimal bactericidal concentrations of vapour intermittently has been described for use in sites where the atmospheric infectivity rate is low and estimation of vapour concentration levels is not possible.

(6) Attention has been drawn to the effect of the relative humidity of the atmosphere and degree of desiccation of bacteria, on the bactericidal activity of the vapours used for air disinfection, and the effect these factors have on the value of air disinfection in the field. In this connection the importance of dust control measures in conjunction with air disinfection has been emphasised.

(7) The effect of the size of the infected particles on their relative infectivity and resistance to disinfection has been discussed, with reference to the interpretation of the value of air disinfection based on reductions obtained in total bacterial population.

(8) Attention has been drawn to the difficulty with which the value of air disinfection can be determined

from the results of field trials. The principal reason has been shown to be the lack of knowledge of the relative importance of airborne and contact infection in the trials described.

(9) It is concluded that an assessment of the probable importance of the rôle of direct contact in the dissemination of infection in each particular environment should be made before air disinfection measures are adopted as a means of restricting cross infection. In environments where direct contact is likely to be the principal mode of infection, the use of air disinfection is likely to be of little value.

(10) The potential value of air disinfection in sites where contact infection can be limited, as in hatcheries, battery houses and poultry houses during stock turnover, has been commented on.

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HOLIDAY EXCHANGE

The following children of continental veterinary surgeons are still hoping for exchange holidays, etc., with the children of British veterinary surgeons. We have been able to make arrangements for quite a number to date, but interested readers are still invited to write to the General Secretary for fuller particulars.

Austria

Exchange

14-year-old boy—Pressbaum (Austria).

France

Exchanges

14-year-old boy—Montaigu (Vendée). Summer, 1956.

14-year-old boy—Champdeniers (Deux-Sèvres). Summer, 1956.

15-year-old boy—Avranches (Manche). Summer, 1956.

14-year-old boy—Neuvy-le-Roi (Indre-et-Loire). Summer, 1956.

13-year-old boy—St. Aubin d'Aubigné. Summer, 1956.

13-year-old girl—Locmine (Morbihan) Summer, 1956.

18-year-old girl—Reims (Marne). Would like to come to Britain this summer and have English girl at Easter.

17-year-old girl—St. Bazeille (Lot-et Garonne. Would like to come to Britain this summer and have English girl at Easter.

16-year-old girl—Valence (Drôme).

Au pair

17-year-old boy, would like to stay in Britain for 10 months but invite an English boy in exchange if desired. He could help British veterinary surgeon in practice, drives car, etc.

Germany

Exchanges

16-year-old boy—Grebendorf-Eschwege (Hessen).

18- and 16-year-old boys (brothers)—Fleckeby (Schleswig-Holstein).

18-year-old boy—Bochum (Westphalia).

Italy

Exchange

14-year-old boy—Florence, Italy.

Current Literature

BOOK REVIEW

Recent Advances in Veterinary Science. Volume II. Edited by G. A. BRANDLY & E. L. JUNGHERR in conjunction with an Advisory Board. Articles are written by 11 contributors. pp. 449. Published by Academic Books, Ltd., London. Publication date December 27th, 1955. Price £4. (U.S.A. $10).

As the name implies this is not a standard text-book dealing fully with any subject, but consists of a presentation of the advances that have been made in each of a selected group of subjects. The absence of the adjective recent, as applied to advances, has the undoubted advantage of permitting the individual writer to present a balanced view of the advances he is describing and discussing.

In choosing the subjects for monographs in any one volume it would be impossible to please everybody. Inevitably the specialist in a particular subject not dealt with may feel that his subject is of sufficient importance and that sufficient advances have been made in it to justify inclusion of a monograph on it. The first volume of the series was published in 1953 and the second volume was published in the autumn of 1955 ; and if this very commendable devotion to covering the field of veterinary science can be maintained, any criticism that a particular subject has been omitted will be stilled before very long.

The present volume—Volume II of the series—covers a wide field and all the subjects treated are of topical importance and interest. If satisfaction can be expressed in regard to the spread of the subject matter, gratification can indeed be expressed that in the choice of authors the Editorial Board have spread their selection over the whole world and so have secured the services of those recognised as experts in their particular fields. It is a remarkable and agreeable fact that, on the whole, these authors have succeeded in presenting their subject matter in a most acceptable form.

To do justice to a volume of this type, a review must present a synopsis of the ground covered. Space alone, however, precludes dealing with each section in very great detail.

There are 11 sections and these are dealt with by 11 individual authors. The first section entitled Epizootiology of Virus Diseases is written by Richard E. Shope, of the Rockefeller Institute for Medical Research, New York. This section extends to 41 pages and there are approximately five pages of references. That so much knowledge is gathered together in a balanced view of the whole subject makes this section a most useful one.

The second section, dealing with Mycoses of Animals, is by Chester W. Emmons, of the National Microbiological Institute, Bethesda, Maryland. This section extends to a little over 10 pages with three and a half pages of references. As a description of advances it is frankly disappointing ; it could be more accurately described as an imperfect catalogue of literature dealing with the subject in a very cursory manner. The portion dealing with dermatophytosis (ringworm) extends to less than one page. Four lines are devoted to a platitudinous but incomplete statement of the importance of ringworm.

The third section dealing with Respiratory Diseases in Poultry is by Henry Van Roekel of the Department of Veterinary Science, University of Massachusetts. Extending to some 33 pages with nine pages of references, this section furnishes a helpful review of the subject and is embellished with a precise summary.

The fourth section, on the Blood Groups of Animals, by L. C. Ferguson, of the Ohio Agricultural Experiment Station, deals adequately with the subject matter in 28 pages supported by four pages of references. The subject matter is presented in an interesting and informative way and the section will amply repay study by those interested in it.

The fifth section, by I. J. Cunningham, Animal Research Station, Wallaceville, New Zealand, is concerned with Diseases caused by Deficiencies of Trace Elements. The importance of the subject justifies the 33 pages devoted to it, and the scope of the literature studied is shown by over 11 pages of references. This section is indeed a well-balanced critical exposition of the subject matter. It is written in a most readable style. Important points receive precise emphasis, thus "The diagnosis of cobalt-deficiency cannot be made with certainty on symptoms alone" ; and there are two cogent paragraphs emphasising the folly of using "shotgun" mixtures of trace minerals.

The sixth section is also from the pen of a New Zealand author, N. T. Clare, of the Ruakura Animal Research Station, and is concerned with Photosensitisation in Animals. The subject matter receives adequate attention in 25 pages with five pages of references. Naturally photosensitisation due to drugs—especially some of the newer drugs—occupies a considerable part of this section which includes a study of the fundamental mechanisms of photosensitisation.

The seventh section, on Rumen Dysfunction, is written by A. T. Phillipson, of the Rowett Research Station, Aberdeen. As might be expected it is a lengthy section of some 42 pages with over eight pages of references. This section will amply repay the time spent on a careful study ; it must be of equal interest to practitioner, research worker or teacher.

The eighth section is as topical as the seventh, the subject being Bovine Ketosis and the author J. C. Shaw, Dairy Department, Maryland Agricultural Experiment Station. The 39 pages of the text are divided into four major divisions, Incidence, Etiology, Diagnosis and Therapy. Four main lines of treatment are discussed but it is a commentary on the present position of therapy that the writer found it necessary to include a short portion on miscellaneous treatments. Supported by nearly six pages of references this section merits commendation to readers.

The ninth section, Tickborne Rickettsioses in South Africa, is by D. A. Haig, Onderstepoort. As the title implies this section is restricted to a particular field but consideration of the subject matter and the literature is not entirely restricted to South Africa ; for instance, disease reported from Kenya and Algiers receives mention. The section consists of 16 pages of text with three pages of references.

The 10th section is an extensive one of 48 pages and five pages of references on the important subject of Vibriosis. It is written by W. N. Plastridge, of the Storrs Agricultural Experimental Station, University of

Connecticut. This is a most informative section which deals lucidly with the problem of vibriosis in cattle and sheep, and pinpoints the significance of recent advances in research on bovine vibriosis.

The final section, by Donald C. Boughton, is on the subject of Effective Control of Internal Parasites ; the author is working in the Grasselli Chemicals Department, E.I. du Pont de Nemours & Company, Wilmington, Delaware. The subject is studied from various angles, and it is brought out that the chief advances in veterinary parasitology in recent years are the practical regimens that have been developed for controlling economically important parasites. The summary of this section contains the delightful sentence " There is no market for our annual tonnage of parasitic protoplasm." The section extends to 27 pages with three and a half pages of references.

In addition to a subject index this volume of Advances in Veterinary Science contains an author index of all the references quoted in each section, a practice followed in the first volume.

With a reservation in regard to the shortcoming mentioned in this review, it can be stated with confidence that volume II of Advances in Veterinary Science is a welcome contribution to veterinary literature. Volume II is a substantial advance on Volume I and the appearance of Volume III will be looked forward to with interest. Any member of the veterinary profession, no matter in what sphere his work may lie, will find much of interest in this volume, and, given the time to study each section, will be brought in contact with a great deal of valuable information, which he could only have found for himself after a long and tedious search of literature. Perhaps the most valuable feature of a volume of this kind is that it presents in an accessible form a wealth of information not otherwise readily available to the average reader.

ABSTRACTS

Practical Isolation Equipment for Baby Pigs. HAELTERMAN, E. O. (1956). *Am. J. Vet. Res.* **17** (62). 129–31.

The author describes a simple and inexpensive container in which pigs can be reared in strict isolation up to three or four weeks of age. The apparatus has been used successfully for raising pigs deprived of colostrum and for the study of transmissible gastro-enteritis.

The piglets are kept in sealed bins covered with a sheet of cellophane. Each bin is attached to a forced ventilation system. In order to make strict isolation possible the food troughs are filled from the oustide through a rubber tube. The use of a wire mesh false floor makes it unnecessary to clean the bins during the animal's stay. E. A. G.

Studies on the Climate of Pig Houses (1. Ventilation of Pig Houses). SAINSBURY, D., & SCORGIE, N. (1955). *Brit. Vet. J.* **3** (8). 324–33.

Of 42 piggeries in southern or south-eastern England which were investigated only four were ventilated satisfactorily as judged by a subjective impression of the general atmosphere, by the absence of draughts, by ease of air control to the building, and by the maintenance of suitable air temperature and circulation. The faults commonly found in the ventilating systems of the other 38 piggeries are described. The amount of air passing through almost all the houses was found to be such that it resulted in dissipation of animal heat, creation of draughts and depression of temperature. On the average, only 44 per cent. of the ventilation took place through the ventilators, the remainder taking place through adventitious openings. The design of the ventilators examined was in general bad, as they were without baffles or controls, were of uninsulated construction, and were often placed where they were inefficient and gave rise to draughts.

The commonest method of ventilating the larger pig houses was a capped open ridge for outlet, and some form of wall or window inlet. The open ridge acted exclusively as a stale air extractor only under conditions of near-calm, but in windy weather admitted air currents which were particularly undesirable since they were directed towards the pigs' backs. It was also found that, except in narrow-span buildings, the air tended to pass in through most of the ventilators on both sides, as it was possible for eddies produced at the leeward face of a building to cause air entry on that side.

The outlet ventilator recommended consists of one flue per piggery (or self-contained section of a piggery) situated at the roof centre of the building projecting 2 or 3 feet above the roof ridge. It should be made of wood internally, with insulation board covered with some weather-proofed material externally, and these two " skins " should be separated by a vapour barrier such as aluminium foil. The top is covered with a flat cap, and the bottom is fitted with a regulator or a hinged flap. The height of the outlet should be not less than 6 feet above the level of the air inlets. Details of a method for the computation of the dimensions of the outlet ventilator are given.

The air inlet ventilators should be placed along all the outside walls, one being fitted in the wall above each pig pen within a foot or two of the eaves. A type fitted with outer and inner baffles and a control flap is illustrated, and these, together with hopper windows fitted with side pieces, ensure an even, draught-free ingress of air. However, as all control with this method has to be exercised manually an intake with an automatic " reduction " device worked by the pressure of the wind is preferred. A type with a moving flap progressively shut against a spring by the force of the wind, and a device with a similar object, the Colt Constant Flow Ventilator, in which louvres pivoted on plastic bearings are moved by the wind, are described.

It was found that in some cases cross ventilation alone, by the use of baffled wall ventilators and hopper windows, was effective, but as this could only be attained by very careful and constant hand control of the ventilators, the system previously described was considered preferable.

The following ventilation rates were found satisfactory per 200 lb. pig during the winter months:— well insulated pen with outside yard for dunging and watering, 300 cubic feet per hour; well insulated, totally enclosed piggery with dunging passage, 700 cubic feet per hour; and " deep straw " piggery of sound construction, 800 cubic feet per hour.

J. O. L. K.

REPORT

Medical Research Council. First (Progress) Report by the Tuberculosis Vaccines Clinical Trials Committee entitled B.C.G. and Vole Bacillus Vaccines in the Prevention of Tuberculosis in Adolescents. (1956). *Brit. Med. J.* Feb. 25th. 413-27.

It is now more than 30 years since a live vaccine containing B.C.G. (bacille Calmette-Guérin) was first used in man, but the investigation described in this progress report is the first controlled trial of the vaccine to be undertaken in Great Britain, and one of the few so far undertaken in any part of the world. The early results of the present trial provide clear evidence, over a period of two and a half years, of the efficacy of B.C.G. vaccination, and also of the vole bacillus vaccination, in the prevention of tuberculosis in the particular group of adolescents studied, and in the present circumstances in this country.

The trial involved 56,700 volunteers, all in their final year at secondary modern schools in or near North London, Birmingham and Manchester. Nearly all were aged between 14½ and 15 years at the outset of the trial. The first screening of the 56,700 volunteers excluded those who, at an initial radiographic examination were found to be suffering from tuberculosis, and those known to have been in recent contact with a case of pulmonary tuberculosis at home. At the time of the initial radiographic examination the volunteers were subjected to an intracutaneous tuberculin test with 3 T.U. (tuberculin units). (The tuberculin used was a single batch of heat concentrated synthetic medium tuberculin prepared by the Ministry of Agriculture Veterinary Laboratory, Weybridge.) Those volunteers who passed the initial radiographic examination and were negative to the initial tuberculin test with 3 T.U. were tested with 100 T.U. Those negative to both tests were allocated by a random process to three groups: (i) unvaccinated; (ii) B.C.G. vaccinated, and (iii) vole bacillus vaccinated. This resulted in there being five groups in all:—

tuberculin negative, left unvaccinated ...	(13,300)
tuberculin negative, B.C.G. vaccinated ...	(14,100)
tuberculin negative, vole bacillus vaccinated ...	(6,700)
tuberculin positive to 3 T.U.	(16,000)
tuberculin positive to 100 T.U. but not to 3 T.U.	(6,600)

Vole bacillus vaccine was not used in the London area and was not available for all the time in the Birmingham and Manchester areas.

Complications of vaccination consisted of occasional regional adenitis and delayed healing of the local lesion. Two cases of erythema nodosum were also attributed to B.C.G. vaccine. In addition a number of those given vole bacillus vaccine developed lesions, indistinguishable from lupus vulgaris, at the site of vaccination; of these, 22 required treatment.

Elaborate steps were taken to maintain contact with the volunteers and in this there has been a remarkable degree of success.

All definite and suspected cases of tuberculosis were reviewed and classified by an independent assessor. A total of 163 definite cases began within two and a half years of entry into the trial. Of these, 63 per cent. were of pulmonary tuberculosis and 22 per cent. of pleural effusion without evidence of pulmonary tuberculosis. Of these cases 68 per cent. were severe enough for the patients to be taken off work for at least three months. There were no deaths from the disease during the two and a half years.

The annual incidence of tuberculosis in the tuberculin-negative unvaccinated group was 1.94 per 1,000; in the B.C.G. vaccinated group it was only 0.37 per 1,000; and in the vole bacillus vaccinated group only 0.44 per 1,000. Each vaccine therefore conferred a substantial and similar degree of protection against tuberculosis over a period of two and a half years in adolescence. The strength of the earlier batches of vole bacillus vaccine as shown by their tuberculin conversion rates was below the standard intended; later batches of vaccine were up to the strength intended.

Among the entrants with a positive reaction to 3 T.U. the annual incidence of tuberculosis was 1.75 per 1,000 compared with 0.74 per 1,000 among those positive only to 100 T.U. The annual incidence was particularly high among those with strong reactions to 3 T.U. on entry (15 mm. induration or more) namely 2.93 per 1,000 compared with 0.78 per 1,000 among those with 5 to 14 mm. induration.

The annual incidence of 0.74 per 1,000 among those positive to 100 T.U. compares with 1.94 per 1,000 in the concurrent negative unvaccinated group. These results are not those which would be expected if positive reactions to 100 T.U. only were non-specific for tuberculosis. *The interpretation of weak reactions to tuberculin requires further investigation.*

It is calculated that if no participant in the present trial had been vaccinated a total of 246 cases of tuberculosis would have been expected within two and a half years of entry; if all the tuberculin-negative entrants had received B.C.G. vaccine a total of 111 would have been expected. This represents an expected reduction of 55 per cent. in the total incidence of tuberculosis for the two and a half years. However, 134 cases of previously unsuspected tuberculosis which were present on entry were excluded from the trial, nearly all as a result of the initial radiographic examination. In the absence of this radiograph, many of these cases would apparently have arisen after entry, and the apparent reduction in the total incidence of tuberculosis would have been only of the order of 35 per cent.

The trial is still in progress and later reports will contain more detailed analyses over longer periods of time.

This abstract may very well close with a quotation from an Editorial in the same number of the *British Medical Journal:* "The justification for the trial must rest on its clear and unequivocal results. The evidence seems to be sufficient to convince the most critical, though, as was said in these columns a year ago, no one believes that B.C.G. vaccine gives complete protection."

G. F. B.

News and Comment

THE ROYAL VETERINARY COLLEGE MEDICAL ASSOCIATION

At the first meeting of the Association in the summer term, Mr. R. E. Glover, the Principal of the College, invested the President, Professor H. Burrow, with the recently acquired insignia of office. The idea that the President should wear a badge of office in keeping with the dignity of an organisation which was the first scientific society to be formed by people connected with the veterinary profession and, indeed, foreshadowed the N.V.M.A., was propounded by Mr. M. A. P. Simons when he was a final-year member. The council, under the Presidency, at that time, of Mr. E. F. Lewis, gave him enthusiastic support and through his good offices a suitable medallion was designed and struck.

It was very fitting that Professor Burrow should be the first to wear the new insignia, as his deep interest in the Association goes back over many years to the time when he was appointed to the Chair of Medicine. He has given considerable help behind the scenes, and, characteristically, has never sought recognition or thanks. As adviser, treasurer, and now President, he has always been most active, and to his assistance must be credited much of the success the Association has enjoyed in recent years.

The members were particularly pleased to welcome Mr. Glover at their meeting for the first time since he assumed the office of Principal. His remarks in connection with the presentation were greatly appreciated by everyone, and it is hoped he will be able to find the time to attend future meetings. The high quality of the clinical papers which were presented by Messrs. Nettleton, Greenwood and Teale at this meeting, were a tribute to the valuable work done by the Association through the generosity, each year, of the Governors of the College.

POULTRY AWARD

The general secretary of Poultry Association of Great Britain, announces that the Association has decided to make three distinguished service awards for the current year. The recipients will be: Dr. R. F. Gordon, for distinguished service over many years in the field of research into poultry diseases; Mr. C. Hedderwick, O.B.E., for distinguished service over a long period of years in the sphere of poultry breeding; and Miss M. M. MacLeod, N.D.D., for distinguished services covering many years in the field of poultry advisory work.

The Association initiated, four years ago, the presentation of not more than three awards each year for notable services. The awards take the form of a bronze medal and a parchment.

FOOT-AND-MOUTH DISEASE

The area described in the Schedule below will cease to be an Infected Area for the purpose of preventing the spread of foot-and-mouth disease on June 6th.

The scheduled area is as follows:—

The County Borough of Merthyr Tydfil.

COUNTY OF GLAMORGAN: The Petty Sessional Division of Caerphilly Higher.

Petty Sessional Division of Caerphilly Lower: The parishes of Llanfabon and Van and so much of the parishes of Eglwysilan and Gelligaer as lie within the Petty Sessional Division.

Petty Sessional Division of Kibbor: So much of the parish of Eglwysilan as lies within the Petty Sessional Division.

Petty Sessional Division of Miskin Higher: The parish of Llanwonno.

Petty Sessional Division of Miskin Lower: The parishes of Llantwit Fardre and Pontypridd.

IN THE COUNTY OF MONMOUTH

Petty Sessional Division of Bedwellty: The parishes of Bedwellty and Mynyddislwyn and so much of the parish of Bedwas as lies within the Petty Sessional Division.

Petty Sessional Division of Newport: So much of the parish of Bedwas as lies within the Petty Sessional Division.

REACTOR CATTLE ON COMMON LANDS

After a statement by Mr. Walter Scott, D.V.O., for Worcester, to the effect that reactor cattle were allowed by law to graze on common lands, a local parish council has requested the Malvern Hill Conservators to consider legislation against this practice.

Mr. Scott thought it possible that in a comparatively short time they might find themselves in a free testing area when the service would be offered to those outside the scheme. Only when the scheme was well advanced could the Ministry of Agriculture acquire powers compulsorily to attest cattle and to enclose land.

The chairman said that farmers locally with attested herds were worried lest commons became a " dump " for reactor cattle from miles around. He knew some cattle had been brought from as far away as Kington. He foresaw danger that when Wales was 100 per cent. in the scheme reactor cattle would have to come out into Worcestershire.

" SECRECY " OVER SCRAPIE

Speaking recently at a conference on the control and prevention of diseases in hill and lowland flocks, Dr. J. T. Stamp, Director of the Animal Diseases Research Association, Moredun, appealed to farmers to co-operate more readily with veterinary surgeons. Dr. Stamp suggested that, in cases of scrapie, farmers would not admit the presence of the disease, with the result that survey and research work were hampered. At Moredun they were trying to establish whether scrapie was a genetic disease, or one caused by a virus. Without the collaboration of farmers, however, it would be difficult to make much progress. He reminded his audience that a number of countries would not import our sheep for fear of the disease.

A.I. FEARS DISCOUNTED

Speaking at the annual meeting of the Torrington Cattle Breeding centre, Dr. Joseph Edwards said there was no evidence in support of some alarmist views about infectious infertility so far as A.I. breeding herds were concerned. During the past year, fertility had been maintained at a very stable national level, two thirds of all cows inseminated holding to the first service.

The Milk Marketing Board had, over the past four years, made a fertility survey based on several million cows.

The calving rates of pedigree cattle in The National Milk Records showed remarkable stability in regular breeding from year to year.

THE COLONIAL VETERINARY SERVICE

The following promotion and appointments are noted for the month of May:—

Mr. A. M. Orhan, M.R.C.V.S., Veterinary Officer, Class II, Cyprus, to be Veterinary Officer, Class I, Cyprus.

Mr. N. A. Hancock, B.SC., A.R.C.S., is appointed Veterinary Parasitologist, Northern Region, Nigeria, and Mr. R. M. MacKenzie, M.R.C.V.S., is appointed Veterinary Officer, Eastern Region, Nigeria.

TO HELP THE ANIMAL HEALTH TRUST

The Milk Marketing Board is to buy £5,000 worth of scientific equipment and place it on loan to the Animal Health Trust for use at their new livestock research station at Stock, in Essex. In addition, the experience of the Board's buying department is to be placed at the disposal of the Trust in the purchase of the remainder of the required equipment, which is expected to cost a further £10,000.

BUSINESS DIPLOMA FOR VETERINARIAN

His many friends will be interested to learn that Mr. D. D. Ogilvie, a former President of the Lancashire Division, now in the United States, has just been awarded the Diploma of Business Management of Harvard University. This is regarded as one of the highest business qualifications in America, and it is doubtful if any veterinarian has ever before graduated in it. Certainly no other British veterinary surgeon has done so.

PRESENTATION TO MR. G. W. SANGSTER

As a mark of appreciation of 29 years' service as a veterinary surgeon in Dumfriesshire, the agricultural community of Dumfries and Galloway recently presented a television set to Mr. G. W. Sangster on the occasion of his retirement. He had been the Divisional Veterinary Officer of the Ministry.

PERSONAL

Births

HERROD-TAYLOR.—On May 26th, 1956, to Denise, wife of E. E. Herrod-Taylor, M.R.C.V.S., of Guy Street, Leamington Spa, a son, Jonathan Elliott, brother to Heather, Anthony, and Nicholas.

SOMMERVILLE.—On May 22nd, 1956, to Norma, wife of John Sommerville, M.R.C.V.S., of Lynwood, Baswich Lane, Stafford, a daughter, Fiona.

R.C.V.S. OBITUARY

We record with regret the death of the following member of the profession:—

KING, William Joseph Patrick, Veterinary Inspector, Portal Inspection Office, 106, Ann Street, Belfast. Graduated Dublin, July 21st, 1926. Died May 14th, 1956, aged 54 years.

H. H. TENKU ABU BAKAR BIN IBRAHIM OF JOHORE

Mr. Roderick Macgregor writes:—

I sincerely hope that some better pen than mine will provide a fitting tribute to the memory of my old friend, Tenku Abu Bakar bin Ibrahim, whose death was reported in your issue of May 12th. I feel that I can do but scant justice to his character and still less to his career.

Born in 1898, the second son of the Sultan of Johore, he was sent to England at an early age for his education, which he received at Harrow, and later at the Royal Veterinary College, London, where he qualified in December, 1919. Though a sound English scholar, he never became Anglicised to the extent that he forgot or ignored his own country and people. He was fully aware that if royalty implied privilege, it also implied duty, and, while he seldom availed himself of the former, he never forgot the latter.

Shortly after qualifying, "'Bu" returned to Malaya and entered Government service. In those days the Government appeared to be completely indifferent to the livestock of the countryside and the ruling classes tended to regard veterinary surgeons as adjuncts of the race-course; useful perhaps, but hardly essential. Some 10 years passed before this attitude changed. It is to "'Bu's" credit that in defiance of this attitude he unhesitatingly placed himself from the first on the side of those who regarded our duty as lying first with the farm animals, especially those of the rayat, and only secondly with the overworked race-horses and overfed dogs of the townsfolk.

His ideals were humane and truly great, and his difficulties immense, made the more so by his relations with his father which were seldom of the happiest. Much of his energy was, of necessity, diverted to political matters, perhaps to the detriment of his veterinary work. But this cannot be regarded as a loss, for the Empire owes him a debt for his untiring pro-British propaganda during the dark years of the war and for his effective work with the military administration that followed the liberation of Malaya.

His efforts to improve the animal husbandry of Johore (his own stock) were, by then, becoming successful, and it is pleasing to think that he was finally appointed Chief Animal Husbandry Officer for the whole of Malaya; a small reward for a lifetime of devoted service.

He retired in 1952 and settled in England with his wife and family, where he remained until his death on May 2nd of this year. He truly was a Prince, and a benefactor to his people.

COMING EVENTS

June

6th (Wed.). 113th Annual General Meeting of the Royal College of Veterinary Surgeons at 10, Red Lion Square, London, W.C.1, 12 noon.

Annual General Meeting of the Victoria Veterinary Benevolent Fund at 10, Red Lion Square, immediately following the Annual General Meeting listed above.

7th (Thurs.). Annual Meeting of the R.A.V.C. Golfing Society at the North Hants Golf Club, Fleet, 10 a.m.

8th (Fri.). Annual Dinner of the Royal Army Veterinary Corps Officers Club at Grosvenor House, Park Lane, London, W.1.

Annual General Meeting of the Welsh Division, B.V.A., at the Belle Vue Hotel, Aberystwyth, 2.30 p.m.

9th (Sat.). 14th Annual General Meeting of the Society of Women Veterinary Surgeons at the Royal Veterinary College, Camden Town, N.W.1, 2.15 p.m.

13th (Wed.). Summer Meeting of the Central Division, B.V.A., at the Cooper Technical Bureau, Berkhamsted, Herts, 11 a.m.

Combined Summer Meetings of the Scottish Branch and the Scottish Metropolitan Division, B.V.A., at the Golden Lion Hotel, Stirling, 2.30 p.m.

Annual General Meeting of the Southern Counties Division, B.V.A., at the Grand Hotel, Bournemouth, 7.30 p.m.

14th (Thurs.). Meeting of the Technical Development Committee, B.V.A., at 7, Mansfield Street, London, W.1, 11.30 a.m.

Annual General Meeting of the North of Scotland Division, B.V.A., in the Northern Hotel, Aberdeen, 2.30 p.m.

20th (Wed.). Meeting of the Midland Counties Division, B.V.A., at the Raven Hotel, Droitwich, 2.30 p.m.

Summer Meeting of the Lancashire Division, B.V.A., at the Chester Zoo, Upton, Chester, 2.30 p.m.

22nd (Fri.). Annual General Meeting of the Lincolnshire and District Division, B.V.A., at the George Hotel, Grantham, 2.15 p.m.

10th Ordinary Meeting of the Southern Region of the Association of Veterinary Teachers and Research workers at the School of Veterinary Medicine, Cambridge University, 11 a.m.

Meeting of the South Wales Division, B.V.A., at the Cambrian Hotel, Saundersfoot, 2.30 p.m.

28th (Thurs.). Meeting of the Lakeland Division, B.V.A., at The Hydro, Windermere, 6 p.m.

September

16th to 22nd (Sun. to Sat.). 74th B.V.A. Annual Congress at Royal Leamington Spa.

R.C.V.S. EXAMINATIONS

June 7th, Thursday. D.V.S.M. Written Examinations commence at Edinburgh.

June 11th, Monday. D.V.S.M. Oral and Practicals commence.

June 21st, Thursday, and June 22nd, Friday. M.R.C.V.S. Written Examinations.

June 25th, Monday. M.R.C.V.S. Practical and Orals commence (Panels " A " and " B ").

BRITISH VETERINARY ASSOCIATION QUARTERLY MEETINGS

Wednesday, July 11th, 1956—No. 7, Mansfield Street

10.30 a.m.—Organising Committee.

2.00 p.m.—Home Appointments Committee.

3.30 p.m.—Parliamentary and Public Relations Committee.

Thursday, July 12th, 1956—No. 7, Mansfield Street

10.00 a.m.—Veterinary State Medicine Committee.

12.30 p.m.—Finance Sub-committee.

2.15 p.m.—General Purposes and Finance Committee.

Friday, July 13th, 1956—Connaught Rooms

10.30 a.m.—Council Meeting.

ADDRESSES OF DISEASE INFECTED PREMISES

The list given below indicates, first the county in which are situated the premises on which disease has been confirmed, followed by the postal address and date of outbreak.

Anthrax

Angus. South Mains Farm, Forfar (May 19).

Cumberland. Blencogo House, Blencogo, Wigton (May 18).

Lancs. Crosses Farm, Gorse Lane, Tarleton, Preston (May 24).

Leics. Manor House, Long Whatton, Loughborough (May 17); Bullwell Farm, Normanton (May 22).

Lincs. Usselby Villa, Minting, Horncastle (May 17).

Notts. Smallholding, Thorpe Salvin Hall, Worksop (May 24).

Perth. Clashiegar Farm, Logiealmond (May 21).

Salop. Back Field Blore, Market Drayton (May 21).

Surrey. Clayhall Farm, Reigate (May 24).

Yorks. The Mill, Beeford, Driffield (May 22); Hill Farm, Aldbrough, Hull (May 23).

Foot-and-Mouth Disease

Essex. Nuttys Farm, Childerditch, Brentwood (May 22).

Fowl Pest

Herts. Lane End, Water Lane, Bovingdon, Hemel Hempstead (May 18).

Swine Fever

Bucks. Gossmore Small Holding, Marlow (May 28).

Devon. Dennis Farm, Kerswell, Broadhembury, Honiton (May 26).

Essex. Hill Farm, Frating, Colchester (May 22); Chevening, Walcott Avenue, Rectory Road, Pitsea, Basildon (May 24); Floradene, Lodge Lane, Collier Row, Romford (May 25); Lodge Lane Piggeries, Collier Row, Romford: Piggery, Mill Road, Mile End, Colchester (May 26).

Herts. Ashridge House, Berkhamsted (May 17); 1, Paper Mill Lane, Standon, Ware (May 28).

Kent. Sandling Park Farm, Sandling, Saltwood, Hythe (May 18).

Lancs. Back Lane Farm, Baxenden, Accrington (May 19).

Notts. Radford Street, Allotments, Worksop (May 22); The Cottage, Haggonfields, Worksop (May 25).

Staffs. Swingbridge Farm, Clayhanger Lane, Brownhills, Walsall (May 28).

Suffolk. Moss Farm, Worlingworth, Woodbridge; Orchard Farm, Cratfield, Woodbridge (May 22).

Worcs. Barnet Mill Farm, Harvington, Kilderminster; Brine Pits Farm, Wychbold, Droitwich (May 22); The Lodge Farm, Blakeshall, Wolverley, Kidderminster (May 24).

Yorks. Handsworth Hall Farm, Finchwell Road, Sheffield, 13; Hall Farm, Burton Salmon, Leeds (May 18); Bland Close Farm, Whitcliffe Lane, Ripon (May 23); York Road Farm, Bishop Burton, Beverley (May 28).

CORRESPONDENCE

The views expressed in letters addressed to the Editor represent the personal opinions of the writer only and their publication does not imply endorsement by the B.V.A.

Crystal-Violet Vaccine

Sir,—In the use of the crystal-violet vaccine against swine fever, the injection, if made too deeply, may result in the loss of joints of pork or bacon from that particular part of the animal. If the vaccine has been deposited between the deeper layers of the subcutaneous fat and the musculature, the violet dye remains there for weeks, and may only be discovered when the housewife cuts up the joint. That can spell a lost customer to the retailer and manufacturer.

Yours faithfully,

D. J. ANTHONY.

Marsh & Baxter Ltd.

Brierley Hill,
Staffs.

May 22nd, 1956.

Nutritive Feeding during Distemper

Sir,—Mr. Vigue's welcome letter in your issue of May 12th raises a point of undoubted interest. My own view is that we cannot feed a distemper case too well. By that I mean we must give the best possible nutriment to the patient at every stage of his illness, according to his willingness to take it and his ability to retain and assimilate it. This means that we must have a variety of foods to offer, and flexibility in the rules governing the nursing. I have found that the dog which will not feed at all stands the least chance of recovery. In such a case I approach the attempted cure not by spooning food into him, but by endeavouring to prepare the stomach to accept food, since I believe that a refreshed empty stomach is a better "bet" than one with stagnant sour food in it. I believe, too, that the "little of what you fancy does you good" theory holds just as much for the sick dog as for human beings and I certainly act on it.

My recorded experience has been on greyhounds only, and I assume that on both sides of the Atlantic we must, as yet, accept that no food, or known method of feeding will prevent the onset of nervous symptoms. I have recently tried supplementary mineral feeding to ascertain if there was any benefit to be derived, but results were inconclusive.

It remains a question, then, what percentage loss, by death, would be considered reasonable. My experience shows that in a group of 1714 distemper cases, whose complete treatment has been under my control, I have lost 258 or approximately 15.05 per cent. No expense was spared in our efforts to save these dogs. Immune serum was given in almost unlimited quantities to many of them. Every known human or animal food, normal or invalid, liquid or solid, was at our disposal. Vitamins were freely given but I cannot claim to have administered a lot of drugs.

Affection of the central nervous system is the main cause of death, and if we assume that 80 per cent. of the deaths were due to nervous sequelae (I have no complete record of this, unfortunately) then the number of non-nervous deaths—those in the group most likely to benefit from diet, number 52. How does Mr. Vigue view that result?

Yours faithfully,

JAS. K. BATEMAN.

The Hook,
Northaw.

May 24th, 1956.

Talking Point

Sir,—Last week's contributors on the subject of Animal Welfare Societies evidently feel qualified to speak on account of their strong feelings. These are quite understandable and are shared by myself and, I imagine, the vast majority of the profession. What is most deserving of attention however, is the working out of a policy, and also a unity within the profession in order that collective action may be taken. Though these contributors left us in no doubt that they do not agree with Mr. Hebeler's remarks, they do not go very far towards suggesting an alternative practical policy. More regard might have been paid to the time that Mr. Hebeler has given up in serving the profession on this matter. This does not rule out criticism. It is gratifying that the subject of unfair competition by clinics was mentioned by Mr. Irvine in Parliament recently.

Yours faithfully,

GORDON COX.

8, Paul Street,
Taunton.

May 29th, 1956.

ADVERTISER'S ANNOUNCEMENT

GLAXO LABORATORIES LTD. announce that a veterinary pack of Cytamen, 1,000 micrograms per c.c. in a 10 c.c. vial, is now available.